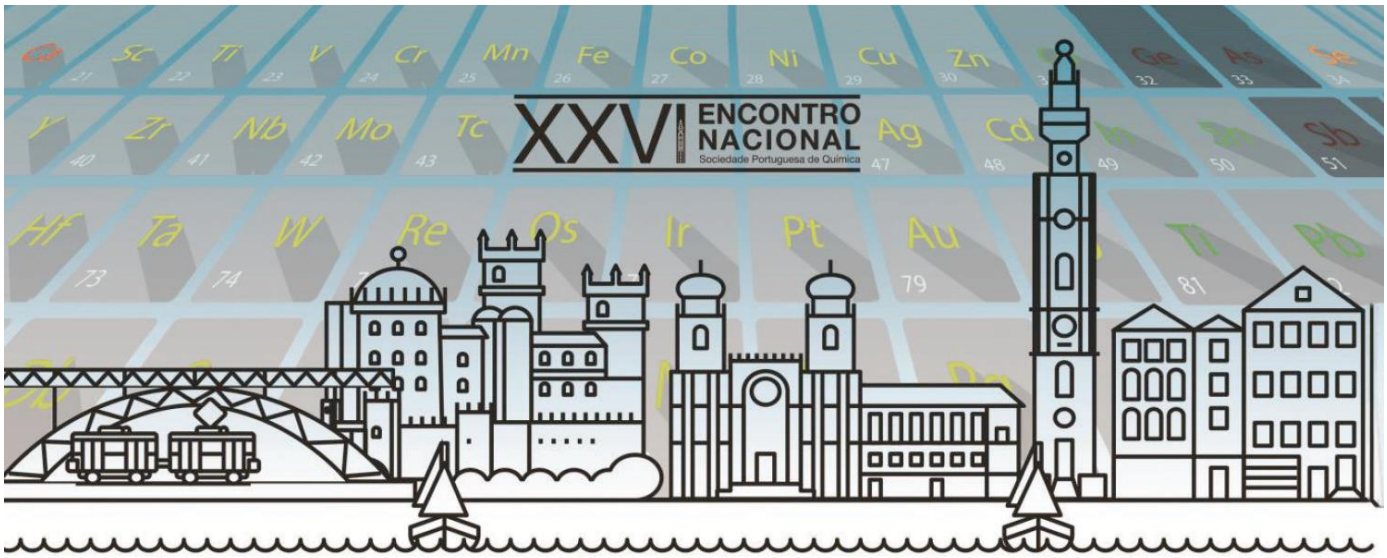

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Health

Study of the effect of chronic kidney disease on urea and ammonia levels in saliva using a sequential injection system with potentiometric detection

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Chronic Kidney Disease (CKD) is a growing health issue worldwide, causing the death of 60,000 people annually. End-stage patients require renal replacement therapies, such as peritoneal dialysis (PD), in order to eliminate part of the uremic toxins built up in the body that, in health, would be eliminated into the urine. The accumulation of these toxins leads to biochemical alterations in different body sites, including the oral milieu. Both salivary urea and ammonia, the latter resulting from the hydrolysis of urea by urease-producing commensal oral bacteria, are increased in CKD patients. For this reason, it has been suggested that assessing these parameters could be of potential use to monitor kidney function and even diagnose renal disease. Taking all this into consideration, this work aimed to develop a sequential injection (SI) system to assess and compare salivary urea and ammonia levels between CKD patients and healthy individuals.

A SI system for the potentiometric detection of urea and ammonia in saliva samples was developed and validated. The enzymatic conversion of urea was carried out in-line prior to the detection with a combined ammonia electrode. The developed SI system was applied to samples collected from 38 healthy individuals, constituting the control group, as well as to samples collected from 38 CKD patients undergoing peritoneal dialysis, followed at the outpatient clinic of the Nephrology Department of São João Hospital Centre. The average values obtained for salivary ammonia were 16.8±12.3 mg/dL and 64.9±38.1 mg/dL, and the average values for salivary urea were 19.4±13.9 mg/dL and 87.4±46.2 mg/dL for the control and study groups, respectively (**Figure 1**). Both parameters proved to be statistically different (p-value<0.05) between healthy and diseased individuals, which proves that the developed methodology successfully assessed theses parameters in a wide quantification range.

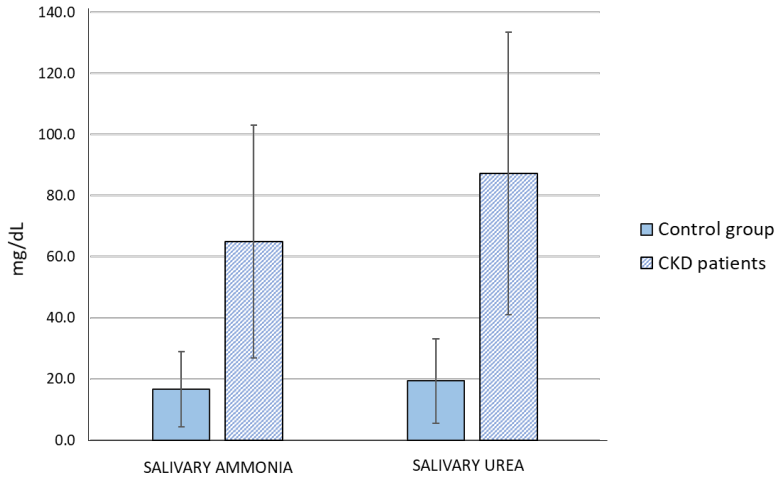

Figure 1: Average salivary ammonia and urea values for healthy individuals (control group) and for CKD patients.

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